

REMARKS

Claims 1, 3, 4, and 6 have been rejected by the Examiner under 35 U.S.C. § 102(e) as being anticipated by Stuhldreher, U.S. Patent 6,080,809 or its equivalent EP 894,819. Also, claims 1, 3, 4, and 6 have been rejected by the Examiner under 35 U.S.C. § 103(a) as being unpatentable over Stuhldreher in view of Fukumoto et al., U.S. Patent 5,591,794. This rejection is respectfully traversed.

The present invention is directed to a rubber composition for tire treads which significantly improves the wet skid performance (grip performance on wet roads) without decreasing the abrasion resistance and rolling resistance of the tire. This advantageous result can be obtained by providing a rubber composition with the following components:

1. A rubber containing at least 35% by weight of a styrene-butadiene rubber;
2. 30-50 parts by weight of clay having a particle size of 0.5 to 10 μm ;
3. At least 5 parts by weight of silica; and
4. At least 1 part by weight of carbon black, wherein the total amount of clay and silica is present in an amount of at least 30 parts by weight and the total amount of clay, silica, and carbon black is present in an amount of at most 100 parts by weight.

As the Examiner will note, claim 1 has been amended to recite that the amount of clay present in the rubber composition is 30 to 50 parts by weight.

This amendment to claim 1 is based upon the results achieved when referring to Example 3 in Table 1 of the present application. In referring to Table 1, it can be seen that when clay is present in an amount of 30 parts by weight, the rolling resistance index and the wet skid index is improved. Please note in this regard that the rolling resistance index and wet skid index for Examples 1, 2, and 4 in Table 1 are not as good as those of Example 3 where the higher amount of clay is present in the rubber composition. This result is somewhat unexpected in as much as the rolling resistance index and the wet skid index do not merely improve by increasing the amount of clay which is added to the rubber composition. Thus, for example, when the amount of clay is increased from 5 to 10 parts by weight as shown in Examples 1 and 4, the rolling resistance index and the wet skid index do not improve but rather become inferior. On the other hand, by continuing to increase the amount of clay to 30 parts by weight as shown in Example 3, both the rolling resistance index and the wet skid index improve. Thus, although in normal geometric progression of the amount of clay might suggest a normal improvement in the rolling resistance index and the wet skid index as can be seen by increasing the amount of clay from 5 to 15 as shown in Examples 1 and 2, this logic is defeated when the rolling resistance index and the wet skid index becomes inferior when 10 parts by weight of clay is utilized as shown in Example 4. Accordingly, it cannot be expected that 30 parts by weight of clay added to the rubber composition would be effective in achieving advantageous indexes for both rolling resistance and wet skid.

In view of the amendments made to claim 1, it is believed that the Stuhldreher reference, U.S. Patent 6,080,809, becomes less relevant when applied to the claims of the present application. Thus, the Stuhldreher patent shows a silica tread composition which utilizes only 10 parts by weight which is considerably below the 30 to 50 parts by weight which is now recited in claim 1 of the present application. Also, the clay component of the referenced patent has a median particle size of from about 0.2 microns which does not compare favorably with the particle size of 0.5 to 10 microns as recited in the claims of the present application. Thus, the clay component of the Stuhldreher does not appear to recognize that higher amounts of clay having a particle size of 0.5 to 10 μm in a rubber composition is effective in enhancing both the rolling resistance index and wet skid index characteristics of a rubber composition for tire treads as defined by the present invention.

It is known that a rubber composition for a tire tread containing silica as a reinforcing agent can increase grip force in a low temperature range of road surface temperature of at most 15°C, but cannot exhibit grip force on wet or semi-wet road surfaces in a high temperature range of more than 15°C. Furthermore, a rubber composition containing silica is significantly decreased in rubber stiffness and grip force as a result of repeated running of the tire (see page 1, line 23 to page 2, line 7 of the present application). The present invention provides a solution for such problems in a composition containing silica, that occur on wet road surfaces in a high temperature range by utilizing 30 to 50 parts by weight of clay in the rubber composition.

As noted hereinabove, the Stuhldreher patent discloses partially substituting silica with clay, but the amount of the clay is merely 5 to 20 parts by weight (see claim 1) and in the Examples (Examples A and B), only 10 parts by weight is utilized. One of the objects of the Stuhldreher patent is to improve traction on snow and ice. Therefore, silica, which can increase grip force in a low temperature, must be added as much as possible, and as a result, the amount of silica that can be substituted for with clay is only 10 parts by weight. That is, the referenced patent does not contemplate to substitute at least 30 parts by weight of silica with clay. Accordingly, the present invention, in which at least 30 parts by weight of clay is compounded in order to obtain sufficient grip force on wet or semi-wet road surfaces in a high temperature range of more than 15°C, is not contemplated and cannot be reached from the teachings of the Stuhldreher patent in which the silica contained therein is partially substitute with clay in a range of about 5 to 20 parts by weight in order to improve traction on snow and ice. For theses reasons, it is believed that the rejection of the claims under 35 U.S.C. § 102(e) is improper and inappropriate and reconsideration thereof is respectfully requested.

The Examiner, recognizing the deficiencies in the Stuhldreher patent has further relied upon the Fukumoto et al. patent in an attempt to suggest the present invention. Although the Fukumoto et al. patent describes blending clay in a tread rubber composition in an amount of from 10 to 40 parts by weight, based on 100 parts by weight of the rubber component, Examples 1 to 11 utilize a maximum amount of 22 parts by weight of clay which is

compounded in the rubber composition, and clearly indicating that larger amounts of clay of 30 parts by weight or more is not contemplated by the referenced patent. Furthermore, although the Fukumoto et al. patent describes that adding silica as a reinforcing agent is preferable (see column 2, lines 47-49), silica is not compounded in the Examples and the object of the invention is merely described as improving the grip force of a studless tire (see column 1, lines 57-60). Therefore, the Fukumoto et al. patent does not compound with clay in order to solve the problems that occur by compounding with silica and accordingly, the Fukumoto et al. patent does not contemplate the Applicants' inventive contribution. Since the Fukumoto et al. patent does not utilize silica and since the referenced patent does not try to solve the same problems as the present invention, it is the Applicants' position that it would not be obvious, as suggested by the Examiner, to modify the teachings of the Stuhldreher patent with those of the Fukumoto et al. patent in an attempt to suggest the present invention. To do so, would require the Examiner to reconstruct the teachings of the references in view of the Applicants' own disclosure.

Accordingly, in view of the above amendments and remarks, reconsideration of the rejections and allowance of the claims of the present application are respectfully requested.

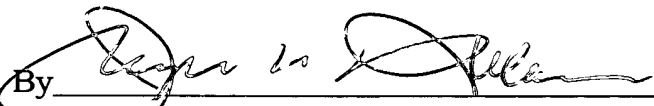
Conclusion

Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Mr. Joseph A. Kolasch (Reg. No. 22,463) at the telephone number of the undersigned below, to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

BIRCH, STEWART, KOLASCH & BIRCH, LLP

By 
Joseph A. Kolasch, #22,463

JAK/mag

P.O. Box 747
Falls Church, VA 22040-0747
(703) 205-8000